standard document containing images, such as a document in the portable document format (PDF) of Adobe Systems, Inc., into an image-less document. The fragmenting tool operates by (i) extracting raster images embedded within the standard document, (ii) storing the raster images on an image server, and (iii) replacing the raster images with references to the stored images, and inserting the references into the document.

[0116] When such an image-less document is viewed interactively by navigation, the raster images referenced in the pages of the document are embedded at an appropriate scale. When such an image-less document is printed or saved at a specified dpi resolution, the raster images referenced in the pages of the document are embedded at an appropriate scale. In a preferred embodiment of the present invention, when a user saves a document, he can select a desired resolution for the save operation. Upon save, the image-less document is converted back to a standard document with raster images, rather than references, embedded therewithin at the user-specified resolution. Similarly, in a preferred embodiment of the present invention, when a user prints a document, the document is converted back to a standard document with raster images embedded at the resolution appropriate to the output device, and then sent to the output device.

[0117] The conversion back from an image-less document to a standard document is performed by means of a composing tool. The composing tool reverses the operations performed by the fragmenting tool, and operates by (i) accessing the images stored on the image server to produce appropriately scaled images, (ii) removing the references to the stored images from the image-less document, and (iii) embedding the appropriately scaled images into the document.

[0118] Reference is now made to **FIG. 6**, which is a simplified illustration of a fragmenting tool for converting standard documents to image-less documents, and a composing tool for converting image-less documents to standard documents. **FIG. 6** illustrates a fragmenting tool that converts a standard document 1 1 0, such as a PDF document, containing an embedded image 720, into an image-less document 730. To achieve scalability, image 720 is extracted from standard document 710 and replaced with a reference 740. Embedded image 720 is stored as an image file 750 on an image server 760, and reference 740 refers to image file 750. Image file 750 may be a Flashpix image file, obtained from embedded image 720 by means of converter unit 770.

[0119] Conversely, as described above, for print and save operations it is necessary to generate a standard document, such as a PDF document, from an image-less document. **FIG. 6** also illustrates a composing tool that converts image-less document 730 into a standard document 800 by using a reference 78,0 contained within image-less document 730. Reference 780 refers to stored image data, such as image file 750. To accomplish the conversion, reference 780 is removed from image-less document 730 and image 790 is embedded in its stead, to produce a standard document 800. Embedded image 790 is generated from image file 750 by image processor 810, to produce an image at the appropriate resolution for the printer or at the resolution specified by the user for saving. As such, embedded image 790 may be at a different resolution than embedded image 720.

[0120] It should be appreciated by those skilled in the art that when converting image-less document 730 to standard document 800, reference 780 may be located external to image-less document 730. In such a case it is unnecessary to remove reference 780 from image-less document 830. Image processor 810 generates embedded image 790 from stored image 750, and then image 790 is embedded into standard document 800.

[0121] Pre-Press Applications

[0122] An important application of the present invention is pre-press graphic arts. A server computer stores a print job in the form of a document that contains high resolution images. A client proofs the job by interactively viewing the document and marking edits in the form of a job ticket. Use of the present invention allows a client to proof a job that includes high resolution images, without the need to transmit the entire job file, images included, back and forth between the server and the client. Typically images used in pre-press applications are of very high quality, and their transmission requires a great deal of memory and bandwidth.

[0123] Reference is now made to **FIG. 7**, which is a simplified schematic diagram of a pre-press application employing a preferred embodiment of the present invention. A server 910 stores an original document containing high quality images therewithin. Such a document can be created by a document creation tool 920, such as Adobe Frame-Maker or QuarkXpress. Server 910 may be a raster image processing (RIP) engine, such as a controller for a color copier as described hereinabove.

[0124] The original document is then processed by a fragmenting tool 930, such as that described hereinabove with reference to **FIG. 6**, which separates out the images from the document and replaces them with references. Fragmenting tool 930 produces two products: an image-less document 940, and at least one high resolution image 950. Image 950 is managed by image server 960.

[0125] Image-less document 940 is the document that is transmitted to a client 970 for proofing. In one embodiment of the present invention, client 970 is a customer computer. In another embodiment of the present invention, client 970 is a management console for a RIP system, such as a controller for a color copier, as described hereinabove. For the sake of clarity and conciseness, the subsequent description relates to the embodiment wherein a customer proofs his job using a customer computer.

[0126] The customer receives image-less document 940 on client computer 970, together with screen resolution versions of image 950. An operator console 980 including a client user interface allows the customer to view the document and the images on a video display interactively, by zooming in and out of the pages and by panning through various portions of the pages. Corresponding to each interactive request to view a portion of a page, client 970 issues IIP requests to server 910 for appropriate image data. Such requests may include server-side processing commands, such as the CVT command describer hereinabove, or client-side processing commands, such as the TIL command described hereinabove, or a combination of both server-side and client-side processing commands.

[0127] As the customer interactively views and proofs the document on the video display, he marks changes and